



INTERACTIVE QUALIFYING PROJECT

Abrasive Blasting, High Pressure Washing and Lead-Based Paint in San Francisco

Submitted By

Chris Dagdigian

Sean G. Conley

Matt Wassel

DOCUMENTS DEPT.

JAN 16 1996

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In Cooperation With

The City and County of

San Francisco Department of Public Health

Bureau of Toxics, Health and Safety Services

May 5, 1994

WPI Faculty Advisor: Professor James Demetry

This project is submitted in partial fulfillment of the degree requirements of Worcester Polytechnic Institute. The views and opinions expressed herein are those of the authors and do not necessarily reflect the positions or opinions of Worcester Polytechnic Institute or the San Francisco Department of Public Health, Bureau of Toxics, Health and Safety Services.



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This project was sponsored by the Bureau of Health, Toxics and Safety Services of the San Francisco Department of Public Health. One of its major outcomes was the compilation and review of abrasive blasting regulations from seventeen states, counties, cities and towns. Extensive background research was conducted on issues, laws and regulations (both current and proposed) concerning lead-based paint and surface preparation of residential exteriors in the City and County of San Francisco. Our objective was to identify and propose suggestions aimed at reducing environmental and health dangers encountered with residential surface preparation activities such as abrasive blasting and high pressure washing. We have placed our recommendations in the form of a draft ordinance.

REF 628.52 D132a

Dagdigian, Chris.

Abrasive blasting, high
pressure washing and
1994.

DEPARTMENT OF TOXIC SUBSTANCES CONTROL

1011 N. GRANDVIEW AVENUE
 GLENDALE, CA 91201
 (818) 551-2800



(818) 551-2868

23 May 1994

Karen Cohn
 Childhood Lead Prevention Program
 San Francisco Department of Public Health
 1380 Howard Street, 2nd Floor
 San Francisco, CA 94103

Dear *Karen* ~~Ms. Cohn~~:

ABRASIVE BLASTING, HIGH PRESSURE WASHING AND LEAD-BASED PAINT IN
 SAN FRANCISCO

I reviewed the above document which you sent to me and I have
 some comments.

...sentence states there are no regulations
 "...disposal of liquid waste..." If a waste,
 liquid waste, is a hazardous waste it is
 disposed of under regulations in Title 22,
 Code of Regulations, Division 4.5. The
 Water Quality Control Boards may have
 for liquid wastes that are not hazardous but
 at the maximum contaminant levels.

"In California, lead-based paint is defined
 as having a lead content of 0.05 percent or greater lead content by
 weight. This definition does not appear to be correct. The Consumer
 Product Safety Commission restricted the lead content
 on residential structures to 0.06% by weight,
 and Alameda County likewise uses 0.06% as the maximum
 lead in paint. HUD defines lead paint as having
 a lead content of 0.5% or greater lead by weight. I
 did not find a California definition of lead-based paint
 in any of the laws I read (e.g., Childhood Lead
 Prevention Acts of 1986, 1989, 1991), thus I do
 not think it is correct to refer to a California

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Page 14: "There are four characteristics which make a material
 hazardous:..." "Material" should be changed to read
 "solid waste." Title 22, and RCRA, do not define
 hazardous characteristics of materials, only wastes. (A
 solid waste is solid, semi-solid, or liquid.)

Page 15 The last paragraph is incorrect in several areas. "The
 first test is the Total Threshold Concentration test
 (TTC)..." No. The regulatory level is the Total

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SAN FRANCISCO

I reviewed the above document which you sent to me and I have
some comments.

Page 6: The last sentence states there are no regulations
concerning "...disposal of liquid waste..." If a waste,
including liquid waste, is a hazardous waste it is
managed and disposed of under regulations in Title 22,
California Code of Regulations, Division 4.5. The
Regional Water Quality Control Boards may have
regulations for liquid wastes that are not hazardous but
which exceed the maximum contaminant levels.

Page 10: The sentence "In California, lead-based paint is defined
as having .05 percent or greater lead content by
weight..." does not appear to be correct. The Consumer
Product Safety Commission restricted the lead content
paints used on residential structures to 0.06% by weight,
and Los Angeles County likewise uses 0.06% as the maximum
level of lead in paint. HUD defines lead paint as having
a lead content of 0.5% or greater lead by weight. I
couldn't find a **California** definition of lead-based paint
at 0.05% in any of the laws I read (e.g., Childhood Lead
Poisoning Prevention Acts of 1986, 1989, 1991), thus I do
not believe it is correct to refer to a California
definition.

Page 14: "There are four characteristics which make a material
hazardous:..." "Material" should be changed to read
"solid waste." Title 22, and RCRA, do not define
hazardous characteristics of materials, only wastes. (A
solid waste is solid, semi-solid, or liquid.)

Page 15 The last paragraph is incorrect in several areas. "The
first test is the Total Threshold Concentration test
(TTC)..." No. The regulatory level is the Total

Threshold Limit Concentration (TTLIC); the test is as specified in SW-846 for measuring the total concentration of lead.

"To pass the TTC (sic) standard, a material (sic) must contain no more than 1000 ppm..." A **waste** is a hazardous waste if it contains 1000 ppm or greater; i.e., equals or exceeds 1000 ppm, just as was stated on the previous page for the federal level of 5 mg/L.

The second test is **NOT** the TCLP test, that is the federal test. In California, the second test is the Waste Extraction Test, WET, in which the **waste** (not material) cannot **equal** or exceed the **Soluble Threshold Limit Concentration (STLC)** of 5.0 mg/L. This is very important, because the WET extracts more lead than the TCLP, thus we have a category of hazardous waste we call "non-RCRA." Following only the federal regulations, therefore, will result in the illegal disposal of hazardous wastes in California.

Page 16: "Cal/EPA is responsible for RCRA management in California." The Department of Toxic Substances Control (DTSC) of Cal/EPA is authorized to administer the RCRA program in California. However, we follow the Hazardous Waste Control Law in the Health and Safety Code, not RCRA, because our regulations are more stringent than RCRA. USEPA also must follow the HWCL in California when they are doing enforcements here. This is more than you wanted to know. Just add Department of Toxic Substances Control to the first sentence.

"Classification consists of determining if the item is a listed hazard under RCRA provisions, and evaluating its performance on the TTC and TCLP tests. Materials..." should read "Classification consists of (1) determining if the waste is a listed waste (which lead isn't) then (2) using knowledge or testing to determine which characteristic the waste exhibits. Wastes..." The point needs to be made very strongly that we do not regulated materials, only wastes.

"Conversely, a non hazardous waste is non RCRA listed and passes both tests." The term "non-RCRA waste" refers to wastes that are hazardous wastes only in California, thus the sentence is misleading and confusing. For wastes to be non-hazardous, they must not be listed and pass three tests for toxicity: TCLP, total concentration, and WET. In addition, the wastes cannot exhibit any of the three other characteristics: corrosivity, ignitibility, or reactivity.

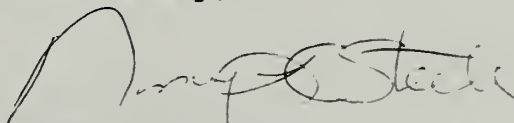
Page 48: "These treatment activities are presently regulated by the San Francisco Department of Public Health..." Treatment of a hazardous waste is regulated by the Department of Toxic Substances Control and I am not aware that we have delegated the regulation of treatment to any local municipality, although you know better than I if SF is also issuing permits for treatment.

The authors of this report did a very poor job of researching and understanding the Hazardous Waste Control Law, its relationship to the Resource Conservation and Recovery Act (RCRA), and the regulations governing hazardous wastes. I am disappointed that I had to make so many corrections; I know that this area of the law can be confusing, but it does not appear that the authors made any attempt to check their facts with the DTSC.

Another comment about this report is that the authors have not referenced laws and regulations throughout the report. This makes it very difficult to use as a reference, and it is never advisable for a generator to rely on someone else's summary of a law or regulation. I always want to double-check and the lack of references makes this impossible. The authors obviously put a lot of work into the report and it is a shame that they didn't properly reference it.

Thanks for the opportunity to review and make corrections to this report. Although what you sent me looks a lot like a final report, it needs to be revised if it is to be correct. I would urge you in the future to let me review any documents your office prepares in which hazardous waste disposal for lead paint abatement is discussed; I do not mind and I will always make the time to do the review. I believe it is very important that generators follow the law and regulations, and waste management for lead paint abatement wastes seems to be poorly understood. If you would like me to make a presentation on the management of lead paint abatement wastes for your staff, I would be more than happy to do so.

Sincerely,



Nancy L.C. Steele
Hazardous Materials Specialist

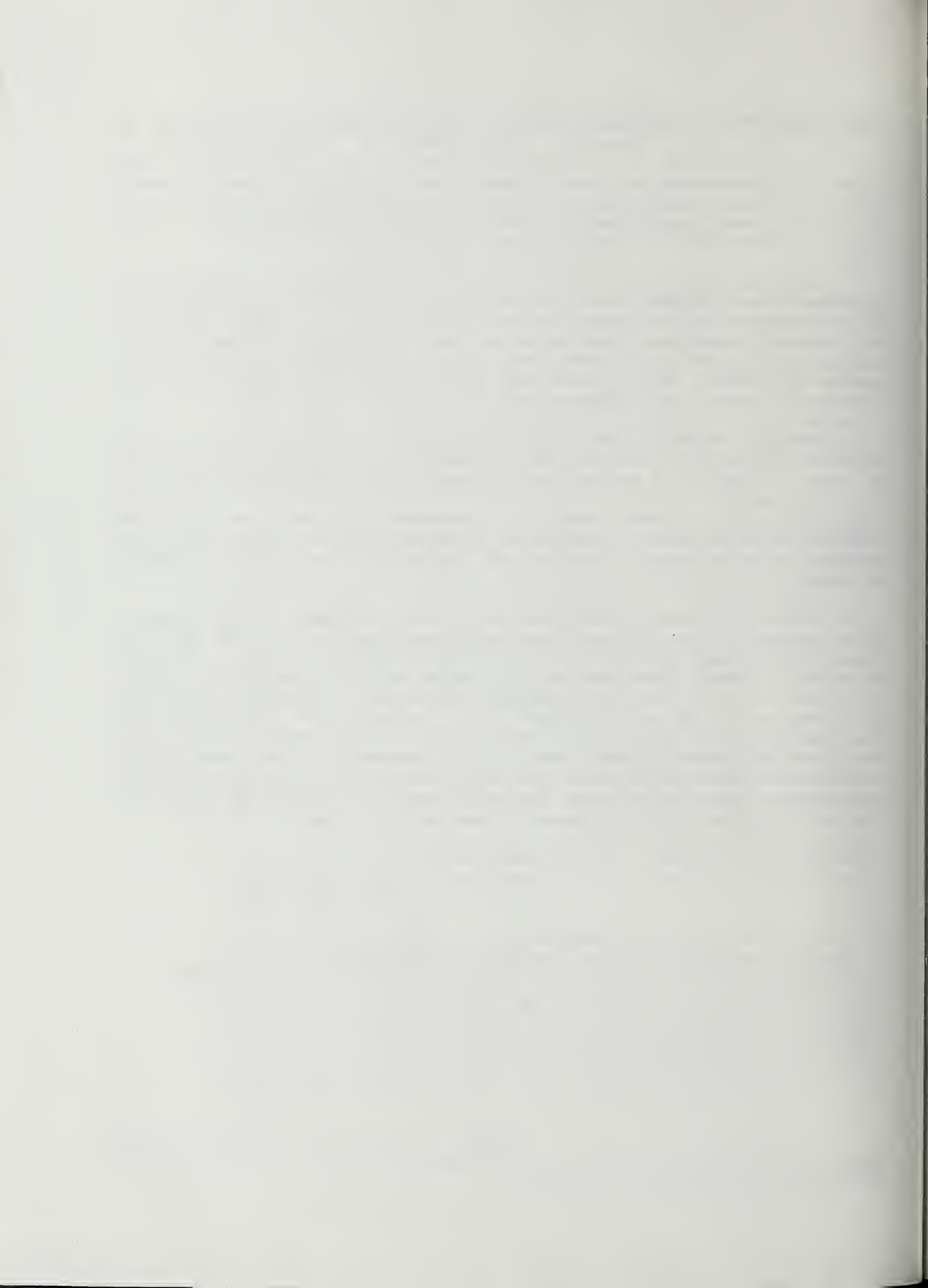


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1.0 Introduction

1.1 Background and project description:

Childhood lead poisoning caused by exposure to lead is the number one environmental hazard facing children today. Environmental exposure to even low levels of lead, amounts equivalent to no more than a few grains of sugar a day, increase children's risks of developing permanent learning disabilities, reduced concentration and attentiveness, and other behavior problems, loss of hearing, reduced growth, and lower intelligence quotients that will affect children's ability to learn and cope with life (Berney, 1993). Recent studies indicate that children with moderate levels of lead poisoning may be six times as likely to suffer from learning disabilities and seven times as likely to drop out of school.

The most significant source of environmental lead is lead-based paint in housing. In San Francisco, approximately 75 percent or 260,000 housing units have been painted with leaded paint, the highest percentage of housing units in a county in California, and one of the highest number of housing units in an urban city in the entire country.

Removal of lead-based paint from the exterior of these 260,000 buildings poses a significant hazard to the environment and the public in San Francisco. When abrasive blasting is employed to remove exterior paint and prepare surfaces for repainting, blasting grit and dust, both of which contain lead, can be dispersed throughout the area. Currently, only the Bay Area Air Quality Management District has regulations governing sandblasting operations. These air quality regulations, however, address only the production of "visible emissions" and are aimed more at industrial producers. This means that even though a residential operation may not produce a "visible emission" level of opacity exceeding the set standard, the worksite and surrounding properties can still be contaminated with hazardous levels of lead.

1.2 Objectives:

- *Prepare a briefing paper for the Bureau of Toxics, Health and Safety Services and the Lead Advisory Committee assessing the potential need for an ordinance governing abrasive blasting operations in San Francisco, the content of the ordinance, and the potential impact of such an ordinance on home owners and the blasting industry.*
- *Conduct a review of abrasive blasting regulations in other areas.*
- *Investigate the issues surrounding water blasting.*
- *Investigate alternate methods of exterior paint removal and surface preparation.*

1.3 Interested parties:

The results of this project will be of interest to the San Francisco Department of Health, the Bureau of Toxics, Health and Safety Services that commissioned this report, the Lead Hazard Reduction Committee, as well as the San Francisco citizens who feel that they were adversely affected by residential abrasive blasting operations. The scope of this project covers all the issues surrounding surface preparation and lead abatement, and thus will be of interest to all of the people of San Francisco, particularly the contractors involved in lead-abatement and surface preparation operations as well as homeowners, landlords and housing tenants who must comply with any abrasive blasting ordinance.

1.4 Interactive Qualifying Project:

The Interactive Qualifying Project (IQP) is a graduation requirement for WPI students and is meant for students to identify, investigate, and report how science and technology interacts with societal structures and values. This project enables engineering students to become directly involved with societal issues, giving them a broader understanding of society and the arenas in which their technology operates.

2.0 Executive Summary

Background:

74% of the San Francisco residential housing stock is estimated to be lead-burdened. As part of normal housing renovation and repainting projects, a common method of preparing exterior surfaces for painting has been the use of abrasive blasting. Without extensive containment and shrouding measures, abrasive blasting can deposit paint debris and dust on surrounding properties. Current regulations address only visible emissions, not the dangers of blasting debris in residential neighborhoods.

The Problem:

Without protective measures, abrasive blasting as a means of paint removal and/or surface preparation on the exterior of residential housing poses a very significant health hazard if lead based paint is present. Activities which disturb surface coatings such as scraping, blasting or sanding can turn a localized hazard (such as deteriorating paint on a section of a wall) into a widespread hazard by spreading toxic levels of lead dust, chips and debris into the air and onto nearby structures and soil. Remediation of this type of contamination is complex and expensive. Current abrasive blasting regulations are very limited and do not address containment and clean-worksite issues relating to lead-based paint.

In addition to abrasive blasting, water blasting and power washing are increasing in popularity because such techniques produce very little airborne contaminants. However, the resulting waste water runoff that is generated from these methods poses a significant problem because the lead concentrations often exceed allowable sewer levels. Currently there are no regulations concerning proper site-containment and disposal of liquid waste generated by these activities.

Our Recommendations:

The City and County of San Francisco needs some type of abrasive blasting and high pressure washing regulations which address clean worksite practices, adequate handling and proper containment of blasting products and lead-based paint debris. The following is a brief outline of the proposed ordinance:

- Mandates proper containment of all blasting material and runoff.
- Notification requirements.
- Dry abrasive blasting without HEPA assist is prohibited.
- Proper containment, handling, and disposal of all debris and runoff generated by hydroblasting, power washing, and water blasting.
- Mandates site preparation.
- Mandates daily site clean-up.
- Identifies evidence of non-compliance.
- *Mandate testing for lead*
- *Permitting or approval process.*

One way to approach this problem is the adoption of a San Francisco municipal Ordinance. We feel however, that another approach may warrant additional consideration. In San Francisco, extensive permits and approvals are needed for most types of home remodeling and renovation projects. Permits are needed for jobs as simple as replacing stairways or window units. In addition to the code enforcement provided by inspectors from the Bureau of Building Inspection, homeowners are under significant peer pressure from their neighbors who can and often do report unauthorized construction. If caught, the owner can be forced to remove the products of unauthorized work and return the dwelling to its original specifications.

If a permitting process for exterior surface preparation work is desired by

the city, utilizing the existing remodeling/renovation permitting process, facilities and bureaucracy would be a logical choice so as to minimize costs of implementation. One aspect which would have to be carefully considered would be the jurisdiction, powers and role of the Housing, Health and Air Quality inspectors, all of whom would naturally be interested in assuring compliance with new surface preparation regulations.

3.0 Procedure

While in San Francisco, we interviewed and gauged the opinions of a wide variety of people involved in or affected by abrasive blasting and exterior residential paint removal. These included people in the Public Health profession, Tenants, Landlords and homeowners, as well as sandblasting contractors, lead abatement professionals, and the citizens who have complained to the Bureau of Toxics, Health and Safety Services. We have conducted extensive background research on lead hazard issues and problems specific to the Bay Area. This included researching all applicable state and federal laws and regulations, including regulations still in the draft stage.

We have met and consulted with members of the Lead Hazard Reduction Committee, a group which under the San Francisco Lead Poisoning Prevention Ordinance is tasked with recommending reduction guidelines and procedures to the city supervisors. In addition, we met with representatives from the Bureau of Environmental Regulation and Management, the Childhood Lead Poisoning Prevention Program, Ca. State Board of Occupational Health, Housing and Urban Development (HUD), Bay Area Air Quality Management, San Francisco Painters Project, San Francisco Painting and Decorating Contractors Association, City Attorney's office, and the San Francisco Department of Public Health.

To gain additional insight and background information, we visited several sites where exterior surface preparation techniques, lead abatement practices, and lead inspections were being conducted. We also attended a lead hazard reduction training course that was offered to the bay area's painting and deleading contractors. This course was designed to educate and protect workers who's job sites possess potential lead hazards.

The final stage of our project was to evaluate the need for new regulations governing abrasive blasting and other exterior surface preparation techniques. Following our evaluation, we prepared and presented a briefing paper to the Department of Public Health and the members of the Lead Hazard Reduction Committee, which contained our recommendations, including draft language for a new city ordinance regulating surface preparation activities.

4.0 Background

4.1 Residential housing in San Francisco:

- Restored Victorians
- Poured-in-place concrete single and multi-family units
- Contemporary wooden single family homes
- City, State and Federal housing projects

4.2 Lead-burdened homes in San Francisco:

Out of 330,000 estimated housing units in the area, 75% of them (260,000) have been painted with lead based paints. This is the highest percentage of housing units in a county in California, and one of the highest number of housing units in an urban city in the entire country.

The lead hazard in paint is directly related to three things:

1. **Concentration**
2. **Condition**
3. **Location**

In California, lead-based paint is defined as having .05 percent or greater lead content by weight or a surface concentration in excess of 1.0 milligrams per centimeter squared. If a paint contains lead, it may or not be a significant immediate health hazard depending on its location and condition. Children are poisoned by lead when they come in contact with lead dust or chips produced by deteriorating paint surfaces. Regardless of paint condition, leaded paint in a place where a small child can scrape or chew on it is extremely dangerous.

Significant lead hazards exist even if homes have been renovated or repainted. In fact, the processes of renovation and preparing surfaces for repainting can easily produce toxic amounts of lead dust which is extremely difficult to remove without specialized techniques such as TSP surface washes and the use of HEPA filtered vacuums. Many techniques used to prepare home exteriors for repainting such as abrasive blasting, scraping, chemical stripping and torch burning produce dust and fumes, which unless contained and disposed of properly, will contaminate adjacent property and soils.

4.3 Zoning

While there are many residential neighborhoods in San Francisco, other areas contain a wide mixture of residential, commercial and business property. In this respect, residents can be affected by large scale activities such as abrasive blasting happening at commercial sites a short distance away.

4.4 Current regulations affecting abrasive blasting operations

- OSHA lead in construction standard if lead is present
- Cal/EPA RCRA disposal regs
- Bay Area Air Quality Management District Regulations
- SF Sewer District Regs (Hydroblasting)
- SF Housing Code (Nuisance)

The only specific rules governing abrasive blasting operations in San Francisco are those stated in the Bay Area Air Quality Management District regulations. These regulations are targeted more at industrial and commercial projects instead of residential. The rules allow sandblasting or abrasive blasting operations to proceed as long as the ambient air does not exceed a certain level of visible opacity. The opacity definitions are defined in the Ringleman standards.

Chapter 4, Section 401 of the San Francisco Housing Code defines a nuisance as the following:

- (1) Any public nuisance known at common law or in equity jurisprudence;*
- (2) Any attractive nuisance which may prove detrimental to children, whether in a building or on the premises of a building. This includes open wells, abandoned basements, or excavations; abandoned iceboxes, refrigerators and motor vehicles; or any structurally unsound fences or structures, or lumber, trash, feces, debris, or vegetation which may prove a hazard for inquisitive minors;*
- (3) Whatever is dangerous to human life or detrimental to health;*
- (4) Overcrowding*

- (5) Insufficient ventilation or illumination*
- (6) Inadequate or insanitary sewage or plumbing facilities;*
- (7) Insanitary conditions or anything offensive to the senses or dangerous to health;*
- (8) Whatever renders air, food or drink unwholesome or detrimental to the health of human beings;*
- (9) Fire hazard or insurance;*
- (10) Substandard building.*

Abrasive blasting, especially on surfaces containing lead based paint can presumably be defined as a nuisance if the contractor fails to take adequate containment and work process measures.

The Air Quality and Nuisance rules are really the only San Francisco regulations on abrasive blasting. Contractors still must comply with State and Federal level occupational health and disposal regulations such as those overseen by OSHA, Cal/EPA and NIOSH.

4.5 Why the paint is being removed

Unlike states such as Massachusetts or federally managed public and Indian housing, lead abatement or management is not required in San Francisco. Generally, lead is only removed from private property if someone has been lead-poisoned or the owner is concerned about liability. Consequently, much of the exterior residential paint removal in San Francisco has and is being done as part of the normal cycle of home renovation and repainting. These jobs are being handled by painting and remodeling companies who are not currently required to have any lead detection or abatement training. Lack of knowledge, clear regulations, enforcement and money has resulted in these contractors employing many surface preparation techniques such as torch burning, scraping and inadequately-contained abrasive blasting. These techniques can contaminate the site, the residents, the work crew and even nearby property with toxic levels of lead. Paint chips containing levels of lead that classify as hazardous waste are being treated as normal construction debris and disposed of in improper and dangerous ways.

4.6 The abrasive blasting and paint removal industry

In San Francisco, if a painting company finds that significant or specialized surface preparation work needs to be done prior to repainting, most will often subcontract out the job to a company or person specializing in surface preparation. In the past this has often been an abrasive blasting or sandblasting company.

4.7 The OLPPP Painters Project

The California Occupational Lead Poisoning Prevention Program (OLPPP) recently received a grant from the National Institute of Occupational Safety and Health (NIOSH) to create and implement a model program aimed at assisting small painters and contractors to comply with the new Cal/OSHA lead in construction standard (see sec. 3.8.1). San Francisco was selected as the program site because it has the highest proportion of pre-1950 housing units in the county (74% of total units).

The Painters Project will involve 25-30 painting contractors in San Francisco County and a main focus will be to create an employee lead safety manual which can be used as a model throughout the state of California and the nation. The OLPPP has recently been successful with a similar project assisting owners of radiator repair shops with regulatory compliance.

4.8 Current lead based paint regulations and legislation

Below is a summary of laws and regulations currently affecting or influencing surface preparation and lead-based paint work.

4.8.1 OSHA Lead in Construction Standard

A new interim lead in construction standard was adopted by the Federal OSHA and became effective on June 3, 1993 (29 CFR Part 1926). As required Cal/OSHA adopted the same regulations as a temporary standard and enforces them under Title 8, CCR section 1532.1, effective Nov. 4, 1993. These OSHA requirements apply to all construction workers exposed to lead.

By December 31, 1994, Cal/OSHA under state law (AB 383 Chapter 1122, 1993) must have a final California lead construction standard.

Until that time, the interim standards remain in place. These include:

Permissible Exposure Level (PEL) of 50 $\mu\text{g}/\text{m}^3$

Action level of 30 $\mu\text{g}/\text{m}^3$ which triggers safety measures

Respiratory protection

Protective equipment, hygiene facilities and practices

Medical surveillance

Employee removal from site at or above 50 $\mu\text{g}/\text{m}^3$

Training requirements

4.8.2 Haz-waste: Applicability of RCRA disposal requirements

The Resource Conservation and Recovery Act (RCRA) is the basic Federal law governing waste disposal. A key distinction under RCRA is that between **solid waste** and **hazardous waste**. Solid waste is regulated by the States under RCRA, subject to minimum Federal standards. By contrast, RCRA establishes a "cradle-to-grave" system for the management of hazardous waste from generation to ultimate disposal.

In RCRA provisions, a waste may be hazardous either because of its characteristics or because it is specifically listed as hazardous. Listed hazardous wastes are unlikely to be generated by lead-based paint abatement or management procedures. There are four characteristics which make a material hazardous: ignitability, corrosivity, reactivity and toxicity. A waste is defined as exhibiting the toxicity characteristic for lead if a standard testing procedure results in the extraction of lead from the waste at a concentration equaling or exceeding 5 milligrams per liter (parts per million). The 5 milligram level is 100 times the National Interim Primary Drinking Water Standard for Lead. The testing procedures are designed to mimic the leaching actions in a landfill. Prior to March 1990, the Extraction Procedure Toxicity Test (EP-TOX) was used. Currently, the standard measure of RCRA toxicity has been replaced with the Toxicity Characteristic Leaching Procedure (TCLP) which is considered to be more reproducible and reliable than EP-TOX.

A study was conducted by the U.S. Environmental Protection Agency's (EPA's) Office of Pollution Prevention and Toxics to determine the applicability of RCRA

provisions to debris generated by lead based paint abatement operations. The study looked at abatement measures occurring at HUD sites and came to some of the following conclusions:

Generally non-hazardous. can be disposed of as solid waste:

filtered wash-water

disposable clothing

respirator cartridges

plastic sheeting (except when used in burning or torching)

Generally found to be hazardous

paint chips and dust

vacuum debris and dust

sludge or liquids from chemical stripping

rags, sponges, HEPA filters, other cleanup materials

"Solids" (plaster, doors, etc.) if lead content exceeds 4 mg/cm²

In addition, the study found that field X-Ray Fluorescence (XRF) measurements of lead in paint are not sufficiently accurate to permit an accurate determination of the hazardous waste status of "solids" and recommends that laboratory analysis be used.

California law requires that a material pass two laboratory tests before it is declared non-hazardous. The first test is the Total Threshold Concentration test (TTC), which evaluates the amount of lead in proportion to weight. To pass the TTC standard, a material must contain no more than 1,000 ppm or 0.1% lead. The second test is the TCLP test (see previous page) in which a material cannot exceed the test limit of 5.0 ppm or 5.0 mg/liter.

4.8.3 Disposal - Title 22

Cal/EPA is responsible for RCRA management in California. Cal/EPA rules governing the disposal of wastes can be found in Title 22 of the California Health and Safety Code. The regulations center around two things; how the waste has been **classified** and who the **generator** is.

Classification consists of determining if the item is a listed hazard under RCRA provisions, and evaluating its performance on the TTC and TCLP tests. Materials that are listed under RCRA or which fail one or both of the tests are classified as Hazardous waste and must be disposed of under stringent requirements. Conversely, a non hazardous waste is non RCRA listed and passes both tests. Non hazardous waste can be disposed of as "solid" or "liquid" waste in an approved landfill under the provisions of Title 22.

Generator status is important as it determines the methods of approved transport and storage. Any person who generates no more than 220 pounds of waste per month and accumulates no more than 2,200 pounds can qualify as a small-quantity generator. Small quantity generators can transport waste themselves to an approved household hazardous waste collection facility. Small quantity generators must obtain transport permits, however, if they plan on transporting more than 50 pounds or 5 gallons of hazardous waste at one time. When more than 220 pounds of hazardous waste are generated per month, permits must be applied for and the waste must be transported from the site by a licensed hazardous waste carrier. In order for a licensed carrier to take the waste, a "Hazardous Waste Manifest" must be properly filled out.

4.8.3.1 Contractors vs. Generators

A hazardous waste **generator** has overall responsibility for ensuring the safe disposal of the waste. A contractor hired to remove paint which contains lead may or may not be considered the generator under Cal/EPA regulations. The property owner is ultimately responsible for the safe disposal of waste and cannot contract away that responsibility. If the owner obligates the contractor to remove and dispose of the waste, then the owner and contractor become Co-generators. The hazardous waste hauler is never considered the generator.

Many contractors feel that the property owner should assume the generator status because they do not want the additional financial and regulatory burden placed upon them. The property owners however, feel that since the contractors are doing the work which results in the accumulation of hazardous waste, they should be responsible for dealing with the safe removal and disposal of the hazardous debris. In addition, property owners are much more likely to be unfamiliar with hazardous waste disposal regulations and would rather the contractor assume responsibility. Ignorance is not a valid excuse though, and all parties involved in improper disposal can be gone after by Cal EPA.

The generator status and disposal responsibility should always be worked out as part of the contract. In absence of a written contract, both the owner and the contractor are liable for all disposal violations.

4.8.4 SF lead poisoning prevention ordinance

(SF Municipal Code (Health Code) Section 1, Part II, Chapter V, Article 26)

The stated purpose of the San Francisco ordinance is to protect the public health and welfare by establishing a comprehensive primary prevention program designed to prevent lead poisoning by reducing exposure to environmental lead. The overall goals are to eradicate childhood lead poisoning and provide universal blood screening and case management for children.

In addition to starting a Childhood Lead Poisoning Prevention organization, the ordinance also creates an inter-agency task force and two citizen advisory committees to help chart San Francisco's planned lead program. The task force is responsible for sharing abatement information and coordinating projects that require more than one agency while the two Citizen Advisory committees work with the problems of lead hazard reduction and lead poisoning prevention. Each committee is tasked with presenting reports to the Board of Supervisors summarizing their progress and findings.

One of the jobs tasked to the Hazard Reduction Committee is the identification of acceptable techniques of removing or covering lead-based paint. Section 1608 (3d) makes reference to these techniques saying that:

Acceptable methods shall prohibit reduction techniques which may damage the health of residents, neighbors or workers. Acceptable methods shall include cleanup and containment procedures.

4.8.5 Air quality regulations

The Bay Area Air Quality Management District has a specific regulation for abrasive blasting (Regulation 12, Standards of Performance - Rule 4) . Since there is no "small generator" exemption, the rules technically can be applied to every sandblasting operation although they were written with industrial and commercial operations in mind. The rules concentrate on the proper storage, labeling and transport of "approved abrasives" and only address visible emissions by restricting the level to a certain level of opacity as determined by the Ringlemann standard. There are no provisions for lead-based paint or particular rules governing residential blasting operations.

When a complaint about abrasive blasting operations is received at the Air Quality District, an inspector is immediately sent out if there is a good possibility that the inspector can witness ongoing operations and possible violations. The inspectors are limited by staff size and by what they can cite. With existing regulations, all that an Air Quality inspector can really do is make sure that approved abrasives are being used, and if possible, measure dust emission and compare it to the Ringlemann Standard. The Inspector must visually witness all violations, including those involving particulate traveling across property lines. Realistically, this is difficult to accomplish. The Air Quality Nuisance regulations have little effect in these situations because they concentrate mostly on nuisances of odor.

4.8.6 Federal law - Title X and TSCA

Enacted in the Fall of 1992, Title X of the Housing and Community Development Act, more commonly known as the "Residential Lead-Based Paint Hazard Reduction Act" or simply as "Title X" regulates property owners, landlords, lenders, Realtors, insurers, abatement contractors, inspectors, laboratories, trainers, home remodelers and state and local agencies. The law seeks to prevent lead poisoning through the evaluation and reduction of lead based paint hazards. The evaluation component

centers on risk assessment and inspection and the hazard-reduction focus is on abatement and interim controls. Title X mandates specific lead reduction activities and procedures, establishes strict requirements for contractor certification and licensing, and increases grants to cities and states.

Timeline of Title X Requirements:

- | | |
|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| April, 1993 | Secretary of Labor must issue an interim final regulation to regulate occupational exposure to lead in the construction industry. Such regulations shall provide safe and healthful employment and places of employment. (§ 1031) |
| October, 1993 | HUD must develop guidelines for federally supported work involving risk assessments, inspections, interim controls, and abatement of LBP hazards. (§ 1017) |
| October, 1994 | EPA and HUD must jointly issue regulations for the disclosure of LBP hazards in target housing offered for sale or lease (by both private parties and government agencies. (§ 1018(a) (1)) |
| Jan. 1, 1995 | LBP hazard reduction procedures established by Secretary to take effect. (§ 1012(a) (3)) |
| October, 1995 | Regulations regarding disclosure of LBP hazards in target housing offered for sale or lease will take effect. (§ 1018(d)) |
| Jan. 1, 1996 | Initial risk assessment must be performed for federally assisted housing constructed prior to 1960. (§ 1012(a) (3) (B) (i)) |
| Jan. 1, 1998 | 25% of risk assessment must be performed for federally assisted housing constructed between 1960-1978. (§ 1012(a) (3) (B) (ii)) |
| Jan. 1, 2000 | 50% of risk assessment must be performed for federally assisted housing constructed between 1960-1978. (§ 1012(a) (3) (B) (ii)) |
| Jan. 1, 2002 | 100% of risk assessment must be performed for federally assisted housing constructed between 1960-1978. (§ 1012(a) (3) (B) (iii)) |

Title IV - Toxic Substances Control Act (TSCA) (15 U.S.C. 2601)

Timeline

- April, 1994 EPA shall issue regulations on standards for performing lead based paint activities. (training programs and certifying and licensing requirements) These final regulations will require that all risk assessment, inspection and abatement activities in "target housing" (pre-1978) shall be performed by "certified contractors" as defined in Title X §1004
- April, 1994 EPA must promulgate guidelines for renovation and remodeling projects which may create a risk of exposure to dangerous levels of lead in "target housing," public buildings built before 1978, and commercial buildings. (§ 402(c) (1))**
- April, 1994 EPA must promulgate regulations that will identify dangerous levels of lead paint, dust and soil. (§ 403)
- April, 1994 EPA must promulgate a "model State program" which may be adopted by any State which seeks to administer and enforce a State program under TSCA. The program will also encourage reciprocity among states as to the certification requirements.(§ 404(d))
- October, 1994 EPA must establish a program to certify laboratories as qualified to test substances for lead content.(§ 405(b) (1))
- October, 1994 EPA must publish and make available to the public a list of certified or accredited environmental sampling laboratories.(§ 405(b) (2))
- October, 1994 EPA must publish a lead hazard information pamphlet for use in connection with Title IV of TSCA and § 1018 of Title X. (§ 406(a))

- October, 1994** EPA must promulgate regulations to require renovators of target housing to provide the lead hazard information pamphlet to the owner and occupant before commencing the renovation. (§ 406(b))
- April, 1995 EPA must complete a study of the extent to which various renovations and remodeling activities cause LBP exposures and LBP hazards. (§ 402(c) (2))
- April, 1995 Secretary of Health and Human Services must complete and report to Congress its studies on the source of lead exposure in children and on means to reduce hazardous occupational lead abatement exposures. (§ 405(c) (4))
- April, 1995 The President must establish appropriate criteria, testing protocols, and performance characteristics for LBP testing and abatement products. (§ 405 (f))
- April, 1996 States must have their certification and licensing programs authorized. EPA shall be responsible for enforcing contractor certification and licensing in any state which fails to have an EPA-approved program by this date. (§ 404(h))
- States may not receive HUD grants for LBP evaluation or reduction under § 1011 of Title X unless they have an authorized program in place by this date under 404 of the TSCA. (§ 1011 of Title X)
- October, 1996** EPA shall revise the regulations for performing LBP activities to include regulations for renovation and remodeling programs that create LBP hazards. (§ 404(c) (3))

Timeline Source: Leslie Zeller and Ellen Widess, Legislation and Regulations Relating to Lead Based Paint Hazards, a publication of the Children's Advocacy Group.

4.9 HUD guidelines and "prohibited practices"

In December, 1993 the National Center for Lead-Safe Housing released a government agency review draft of a document entitled "Guidelines for the Evaluation and Control of Lead-Based Paint Hazards In Housing." This draft, once finalized is meant to replace current lead guidelines being used by the U.S. Department of Housing and Urban Development (HUD). HUD manages all Federally funded housing in the US and its comprehensive guidelines for lead hazard management and abatement are often used as models or standards. Many states and areas without lead regulations or who are just starting to create them use HUD definitions, recommendations and standard clearance levels.

Despite the fact that the HUD guidelines only cover federally funded housing, they have been looked at as the ideal starting point from which to draw up a national lead hazard reduction plan. To this end, it is interesting to note that the current draft version of the new HUD guidelines ***absolutely prohibits the use of open flame burning or torching, non-HEPA machine sanding or grinding, hydroblasting, high pressure washing and abrasive blasting to remove lead-based paint.***

Here is what the HUD draft guidelines say about the prohibited practices:

Open flame burning or torching:

"Burning, torching, use of fossil fueled powered heat plates, welding, cutting torches and heat guns operating above 1100 F are all prohibited as a means of paint removal because of the high temperatures generated in the process. At these temperatures, lead fume may be produced. Lead fume is formed when lead metal is heated into a gas. The gas cools when it comes into contact with cooler surrounding air and condenses into very small particles.

These particles travel easily, are readily inhaled and absorbed into the body and are difficult to clean up. Several researchers have found that worker exposures are extraordinarily high during this kind of work. The fumes may also travel throughout the dwelling, contaminating all surfaces with which they come into contact. "

Machine sanding or grinding without a HEPA exhaust tool:

"Powered machine sanding or grinding is prohibited (regardless of the grit used) because of the large volume of lead dust generated. As a result of these methods, workers have been exposed to extremely high lead dust levels and blood lead levels in resident children have increased. However, machine sanding with a HEPA exhaust tool is permitted... Limited dry scraping or sanding near electrical circuits [where wet scraping would be dangerous] is permitted. "

Uncontained hydroblasting or high pressure water washing:

"Uncontained hydroblasting and high pressure water washing are prohibited, regardless of any additives in the water. Because of the potential for widespread environmental contamination, such activities should be undertaken with full containment. In addition, all water should be captured and contained and treated as potentially hazardous waste. Since capturing and containing all water is not feasible, this method of paint removal is not permitted for lead-based paint abatement work in housing. "

Abrasive blasting:

"Traditional abrasive blasting or sandblasting is prohibited in residential structures, regardless of whether the abrasive material is recyclable or if the area is fully contained. These methods produce widespread dust contamination; full containment is nearly impossible to maintain and guarantee in a residential environment. Abrasive blasting should only be carried out with HEPA assist (HEPA vacuum local exhaust equipment).

If for some reason abrasive blasting must be done in a residential structure, the area must be sealed and placed under negative pressure with at least 10 air changes per hour. If the exterior must be blasted, the entire building must be tented and placed under negative pressure with at least 10 air changes per hour. In both cases, all exhaust air must be passed through a HEPA filter. "

5.0 Review of abrasive blasting regulations

5.1 Regulations covered:

State of Massachusetts

City of Worcester, Ma

Town of Cohasset, Ma

Town of Lincoln, Ma

City of, Ma

State of Rhode Island

State of New Hampshire

State of Minnesota

State of Maine

State of Wisconsin

City of Denver, Co

City of St. Louis, Mo

Allegheny County (Pittsburgh), PA

Maricopa County (Phoenix), Az

Wayne County (Detroit), Mi

Puget Sound (Seattle), Wa

City of Cleveland, Oh

5.2 Examples of regulation requirements

- Permits
- Limits on abrasives
- Limits on type of blasting
- HEPA filtering of all generated dust
- Specification of site prep requirements
- Specification of worksite cleanup requirements
- Identifies what constitutes proof of non-compliance
- Notification of abutters and area schools
- Minimum level of liability insurance
- Maximum wind level
- Operation shutdown if children present
- Best Available Control Technology (BACT) for dust levels

5.3 Types of regulations

There are several different ways that abrasive blasting operations have been regulated:

- **General abrasive blasting ordinance or regulation**

Cities and towns may sometimes have regulations or ordinances dealing specifically with abrasive blasting operations. Generally, abrasive blasting of residential properties is not heavily controlled at the state level unless it is in conjunction with mandating specific types of deleading or lead abatement techniques.

- **As part of Air Pollution / Air Quality regulations**

Many states, cities and towns have air quality rules that apply in addition to federal standards. Sand or abrasive blasting often falls under air quality rules because of the potential for large amounts of fugitive dust to be released into the air. Emission of dust containing lead into the ambient air can constitute violation of pollution, health or hazardous materials laws.

- **Nuisance statutes**

Many cities and towns have nuisance statutes which could possibly be applied to abrasive blasting operations if large quantities of dust and/or noise are generated and released. Dust or debris buildups on adjacent properties could constitute a nuisance if the property owner made a complaint.

- **Lead Abatement policies and procedures**

In states with stringent lead-removal or abatement regulations, the regulations will often mandate the necessary steps that must be taken to de-lead a property to a certain clearance level. These regulations will usually specify which types of removal methods are allowable and even describe the needed site preparation, cleanup and worker safety measures that must be taken.

State of Massachusetts

How abrasive blasting is regulated on the state level:

As part of a statewide law covering lead abatement operations

105 CMR 460.00 Lead Poisoning Prevention and Control

454 CMR 22:00 Deleading

Summary:

Licensed deleaders only

Wet abrasive or HEPA filtering only

Mandatory site prep

Abrasive blasting with sand or other gritty substances may be used only for exterior lead paint removal, and only if proper dust reducing techniques are followed. These techniques involve the use of a wet mist or a simultaneous vacuuming system. Abrasive blasting without wet abrasive or HEPA vacuuming is not allowed.

Due to the extensiveness of the operations required in the deleading process only licensed contractors can legally remove lead in Massachusetts. Massachusetts has both a certificate and licensing program for deleaders.

The director for lead poisoning control for the state of Massachusetts may ban the use of sandblasting of exterior lead based paints where he determines that a risk of lead exposure is too great. Local boards of health may also ban or more stringently regulate the removal of exterior lead based paint. The regulation of exterior paint removal by sandblasting is enforced at local, state, and federal government levels.(MA CMR 460.120, 1992)

Massachusetts General Laws, Chapter 111, Section 31c

A board of health , or any other legal authority constituted for such purpose by a vote of the town or city council shall have jurisdiction to regulate and control atmospheric pollution, including, but not limited to, the emission of smoke, particulate matter, soot, cinders, ashes, toxic and radioactive substances, fumes, vapors, gases, industrial odors and dusts as may arise within its bounds and which constitutes a nuisance, a danger to the public health, or impair the public comfort and convenience...

The above Massachusetts law is cited by many cities and towns when they enact abrasive blasting operations.

Worcester, Massachusetts

The use of abrasive blasting for exterior lead removal is not allowed at all in Worcester (Worcester DOH, personal communication).

Town of Cohasset, Ma

Title: Abrasive Blasting Regulations

Authority: Board of Health

Enacted: 1988

Summary:

Permit / application needed, Fee: \$50.00

Applicant must justify why alternate methods are not being used

Wet and dry blasting allowed

Board of Health can restrict operations to specific times and weather

Permit can be denied if alternate methods are safer

Visible emission or material buildup can constitute evidence of non-compliance

Mandatory site prep / cleanup

The town regulations regarding abrasive blasting were enacted in April of 1984. Abrasive blasting on residential property requires a permit from the Board of Health. The permit fee is fifty dollars. Both dry and wet abrasive blasting are allowed with proper enclosure techniques. Respirators must be worn for any type of blasting on any type of material, and the worksite must be cleaned within two hours of operation shutdown each day. The Board of Health may limit operations to specific times and types of weather. The Board has the power to reject or revoke any permit if it feels alternative methods are better or if abrasive blasting operations may interfere with health or public safety. Material buildup or visible airborne emissions visible on adjoining private or public property is considered proof of non-compliance with the regulations. There are no specific rules dealing with lead paint removal other than stating that it must be disposed of in an approved manner. In personal communication with the Cohasset Board of Health, it was determined that there had been no changes or additions to the regulations and that there have been no permits asked for or given in at least five years (Abrasive Blasting Regulations, Cohasset MA, 1984).

Title: Abrasive Blasting Regulations

Authority: Board of Health

Enacted: December, 1984

Summary:

Permit needed, Fee: \$35.00

PERMIT DENIED IF LEAD BASED PAINT IS PRESENT

No exterior blasting if wind exceeds 20 mph

No visible or particulate matter should extend across property lines

Board of Health can restrict operations to specific times and weather

Visible emission or material buildup can constitute evidence of non-compliance

Mandatory site prep / cleanup

Lincoln's regulations were enacted in December of 1984. The abrasive blasting regulations are almost identical to those of Cohasset, Ma. The major exception is that no permits will be granted to remove interior or exterior paint that tests positive for lead. Personal communication with the Lincoln Board of Health revealed no changes in the stated regulations and that the Town has never granted a permit for abrasive blasting (Abrasive Blasting Regulations, Lincoln Ma, 1984).

City of, Ma

Title: Abrasive Blasting Regulations

Authority: Board of Health

Enacted: Amended March, 1987

Summary:

Permit needed, Fee: \$50.00

Notification of intent to all property abutters and structures within 200 ft radius

Proof of insurance

No exterior blasting if wind exceeds 15 mph

No visible or particulate matter should extend across property lines

Visible emission or material buildup can constitute evidence of non-compliance

Mandatory site prep / cleanup

A permit is required for any type of abrasive blasting on homes, buildings or structures. When filing for a permit, the applicant must notify property abutters via certified mail of his or her intentions and enclose a copy of the application. Abutters are considered the owners of any home, building or structure within 200 feet of the proposed site of abrasive blasting operations. All permit applicants must have proof of insurance in an amount of at least \$100,000 - \$300,000 to cover claims of personal injury or property damage. There are no specific rules for lead-based paint. Personal communication with the Board of Health revealed no changes in the regulations since 1984 and that several permits had been granted in the past nine years (Abrasive Blasting Regulations, City of, 1984/1987).

State of Rhode Island

How abrasive blasting is regulated on the state level:

Air Pollution Control Regulation No. 24

"Removal of lead based paint from exterior surfaces"

Summary:

Any paint that contains no more than 0.05% lead by weight is exempt from this regulation

Notification required

Mandated site prep and cleanup procedures

Debris containment procedure must be approved in writing by Division of Air Management

Dry blasting allowed only with HEPA collection of all dust

Hydroblasting / wet blasting only with containment system and shrouding

Abrasive blasting operations may not commence until the Department of Environmental Management has approved in writing, a submitted operations plan. Dry abrasive blasting may only be used in conjunction with a vacuum system equipped with a HEPA filter to capture all abrasive and paint particles. Wet blasting may be used provided that the liquid produced must be contained and disposed of properly. For both procedures, vertical shrouding and ground tarpaulins must be used to contain dust.

Before commencing operations, all occupants living within the structure and in a fifty foot radius must be notified in writing. In addition, the building owners and the principal or chief administrator of any school within fifty feet must be notified. Notification consists of location, dates of start and completion, procedure used, and the name and address of a responsible party. The notification must also contain the following statement:

"The paint which will be removed from this structure contains lead. Exposure to lead is unhealthful, particularly to young children. Contact the Department of Environmental Management, Division of Air Resources, at 277-2808 for more information."

Site preparation consists of covering all furnishings, toys and play equipment within fifty feet with impenetrable plastic. The plastic must be staked and weighted to ensure containment. The house or structure must be sealed off at all doors, windows, vents, and air-conditioning units. Site preparation for structures other than buildings must ensure that no particulate escapes.

All worksheets must be cleaned up at the end of daily operations. If dry abrasive blasting was used, all spent abrasives on the ground must be sprayed with a fine mist of water and collected in appropriate containers. A visual inspection of all areas, including areas beyond the worksite must be conducted (Rhode Island Air Pollution Control Regulation No. 24, 1993).

State of New Hampshire

How abrasive blasting is regulated on the state level:

New Hampshire Code of Administrative Rules, Public Health Services
Part He-P 1805 Lead Paint Poisoning Prevention and Control.

Summary:

Lead level of paint must be determined before commencing operations
Exempt from regulation if no hazardous lead levels present
No abrasive blasting if wind exceeds 10 mph
Notification of intent

New Hampshire has extensive regulations governing all types of lead removal. Exterior abrasive blasting may only be used if precautions are taken to minimize dust generation. In order to begin operations, drop cloths must be used, all doors and windows must be sealed and the wind may not be in excess of ten miles per hour. All property abutters and the local health officer must be notified at least three days prior to initiation of removal (New Hampshire Lead Paint Poisoning Prevention and Control Law, 1988).

Regulating authority: Minnesota Pollution Control Agency

Summary:

Notice of intent

Mandates site prep / cleanup

Dry and Wet blasting prohibited, instead use "Modified-wet Blasting"

Vacuum blasting exempts operator from some shrouding requirements

Minnesota has extensive regulations regarding deleading and abrasive blasting. Contractors must test each layer of paint for lead content. Notice of intent must be sent to all adult occupants and owners of the building as well as to any school or child care facility within 100 feet of the worksite. Additional notices must be sent to the Commissioner of the Minnesota Pollution Control Agency . Notices must be given five days before start of the project, and the notices must contain information relative to the commencement and completion dates of the work, the test results of the paint to be removed, name and phone number of the contractor, and the expected hours of operation.

Before work may commence, all doors, windows, air-conditioners and vents on adjacent walls of the building as well those on walls abutting the property within fifty feet must be completely sealed. All children's toys and play equipment, as well as all pet bowls and toys, must be removed or completely covered. If any building is within twenty feet, vertical curtains must be hung. If multiple curtain sections are used, they must overlap by at least 1 1/2 feet. The ground must be completely covered twenty five feet from the building with an additional ten feet added for each story on the building. The ground tarpaulins must be staked or weighted down and must be overlapped by a minimum of 1 1/2 feet. If visible emissions occur at a distance from the building greater than the ground cover, the blasting must immediately cease until the contractor adds more covering, hangs curtains or changes the method of blasting.

Cleanup consists of removing all debris from the roof, gutters, ground covers, soil, grass, walkways, porches, patios, steps, outside window wells, door wells, shrub and flower beds, and in any place where particulate is visible. Cleanup methods must

not involve positive air pressure or water streams which merely relocate debris to another location. Air pressure may be used to remove debris from walls, but only if ground covers are still in place.

Wet abrasive blasting is not allowed. Modified-wet blasting as defined as, "abrasive blasting with the addition of a minimum quantity of water in the air abrasive stream such that dispersal of particulate matter is suppressed with little or no adherence of waste material to the substrate," is allowed. If a contractor uses vacuum-blasting, he or she may be exempt from some shielding requirements if the vacuum surface is in constant contact with the surface that is being abraded. If a child comes within fifty feet of the worksite, all operations must immediately cease until the child leaves or is removed.

Regulating Authority: Department of Natural Resources

Title: Chapter NR 415, Air Pollution Control

Enacted: Revised September 1987

Summary:

Lead emission limitations

Ambient air emission limitations

Air pollution regulations essentially mandate use of dust control techniques when sandblasting. It is unlawful to cause or emit particulate matter into the ambient air which substantially contributes to the exceeding of an air standard. Emission of lead into the ambient air is specifically addressed in that it is, "unlawful to permit lead or lead compounds to be emitted into the ambient air in amounts greater than the department may establish by permit condition, by rule or by special order."

Regulatory Agency: Department of Human Services

Title: Chapter 216 - Rules for Abatement of Environmental Lead Hazards

Effective: November 28, 1993

Summary:

- Regulated under lead abatement rules
- Blasting on exteriors only
- Wet-misting or HEPA vacuum blasting only
- Posting / Notification requirements
- Limited access to work area

As soon as a lead hazard is identified, notices must be posted informing of the hazard and the operations commencing to abate it. Any blasting other than vacuum blasting or wet-misting is prohibited. Only inspectors, contractors and the dwelling owner are permitted access to the worksite during abatement procedures. In cleaning up exterior areas, all visible debris must be removed, all porches must be wet vacuumed, all surfaces must be washed, and lead-containing waste must be disposed of in 6 mil poly bags.

City and County of Denver, Co

Regulating Authority: Department of Health

Title: Air Pollution Control, Section 4-10, Nuisance

Summary:

Nuisance statute

Denver has an air pollution control law with a nuisance clause that is pertinent to abrasive blasting. A nuisance is defined as, "the doing of or the failure to do something which allows or permits air contaminants to escape into the open air which are or tend to be detrimental to the health, comfort, safety or welfare of the public, or which causes or tends to cause substantial annoyance, inconvenience, or injury to persons exposed thereto, or causes or tends to cause damage to property."

City of St. Louis, MO

Regulatory Agency: Department of Public Safety

Title: Section 15, Preventing Air Contaminants from Becoming Airborne

Summary:

- Notification of intent

- Must describe why alternative methods are not being used

- Mandates site prep / cleanup

- Exterior abrasive blasting prohibited during some hours in the city

- Must have claim insurance

- Dry blasting only allowed with stringent dust containment methods

No person can cause or permit abrasive blasting on the exterior of any building or structure without notifying and getting approval from the Commissioner of Air Pollution Control. In order to receive approval, the applicant must explain why abrasive blasting rather than some alternative is necessary in addition to explaining the steps that will be taken to minimize and remove the particulate matter from the site and adjoining areas. The Commissioner will approve an application for abrasive blasting in a residential area, or within 500 feet of a residential area ONLY if the Best Available Control Technology (BACT) is used at the site to prevent spread of particulate. Wet or dry blasting is allowed, and the site must be cleaned daily from the site and adjoining areas. The person responsible for abrasive blasting must have adequate insurance to protect against damage claims to vehicles or other property due to medium, dust or created conditions.

Maricopa County (Phoenix), Arizona

Regulatory Agency: Division of Public Health / Board of Air Pollution Control

Title: Regulation III - Control of Air Contaminants, Rule 300, Visible Emissions

Summary:

Visible emissions limits

Maricopa County air pollution regulations prohibit any sandblasting or abrasive activity without taking reasonable precautions such as enclosures and the use of wet blasting. If abrasive blasting is found to be a "nuisance" as defined by law, it may be stopped.

Wayne County (Detroit), Mi

Regulatory Agency: Health Department

Title: Section 806, Dry Blasting (Proposed 1988)

Summary:

Wet blasting preferred over dry blasting

Operation must stop with adverse wind conditions OR winds exceed 20 mph

Can operate in 20+ mph conditions if containment is approved

Lead removal must not exceed ambient air limitations

Visible emissions not to exceed 20 percent opacity

Possible restrictions on the number of nozzles in operation at any one time

Puget Sound (Seattle), Wa

Regulating Agency: Puget Sound Air Pollution Control Agency

Title: Section 9.11 and 9.15

Enacted: Amended 1988

Summary:

Unlawful to cause emission of contaminants that cause harm to health.

Unlawful to cause emission of fugitive dust without proper enclosure methods.

Outdoor blasting must use control measures.

Abrasive blasting with sand must be done in a blasting cabinet.

It is unlawful for any person to cause or permit the emission of a particulate that may be injurious to human health, plant or animal life (Puget Sound Air Pollution Control Agency).

City of Cleveland, OH

Regulatory Agency: Department of Public Health and Welfare - Air Pollution Control

Title: 277.11 Sandblasting and/or Building Cleaning

Enacted: June 30, 1976

Summary:

Permit required, fee \$25.00

Commissioner authorized to regulate times and hours of abrasive blasting

"Special Terms" appended to each approved permit

Cleveland's air pollution control regulations require a permit for abrasive blasting. Applicants must provide proof of plans for adequate containment of dust and water as well as cleanup and disposal plans. Dry blasting is not allowed unless some type of mechanism for capturing debris is attached to the blasting nozzle or is within the enclosure.

Allegheny County (Pittsburgh), PA

Regulatory Agency: Board of Health

Title: Section 533, Abrasive Blasting

Enacted: Amended August 22, 1988

Summary:

Permit needed, Fee: \$100/\$250

If lead is present, air monitoring may be required

Suspension of operation if ambient lead level is exceeded

Mandated site prep / cleanup

Applications for permits must contain detailed description of the nature of the work as well as the surface to be blasted. Applicants must justify the use of abrasive blasting over the use of alternative surface preparation techniques. An approved laboratory must test for lead content. Operators must store all abrasives in a proper manner and take precautions to clean the worksite and minimize the production of fugitive dust.

6.0 Water blasting

6.1 What is water blasting?

Due to the recent increase of concern and awareness of the hazards of lead and its effects on human life and the environment, the painting industry has been slowly shifting to safer and less threatening methods of lead-based paint removal. water blasting is one of the new techniques that is starting to become more and more popular as a method of exterior surface preparation in the painting industry (Lewis, Thomas). water blasting is the use of a pressurized stream of water to forcefully remove aged layers of exterior paint. According to local contractors, the water must be subject to 10,000 pounds per square inch of pressure or greater to be considered water blasting. Anything under 10,000 pounds per square inch is considered to be "power washing". While the method of water blasting is thought to be safer than some of the earlier techniques, such as sandblasting and dry scraping, it is not completely safe and without problems.

6.1.1 Who is using water blasting and why?

Water blasting is currently being used by many of the contractors in the San Francisco Bay Area. The reasons for using water blasting may differ from contractor to contractor and possibly even from job to job. However, one reason remains constant; water blasting is one of the most economically efficient and least controversial methods of exterior paint removal used today. Another reason for its use is that it is a time efficient and thorough method of removal (Lewis, Thomas).

6.1.2 Benefits and problems associated with water blasting

Some of the benefits of water blasting are the reasons for its growing use and demand. It is relatively inexpensive, time efficient, thorough, and it seems to be relatively safer than some alternative methods because it creates less airborne dust particles. Although it is safer than some of the alternative methods of paint removal, it does have its problems and should be regulated (Lewis, Thomas).

One of the main problems with water blasting is that it is a relatively new technique and there are no obvious or consistent procedural steps or regulations to follow. While the use of water blasting does reduce the amount of lead released into the atmosphere, it at the same time creates a hazard to the environment because of the lead particles in the runoff water. The question of, "What do you do with the

resulting water now that it has been contaminated with the lead paint chips?", is one that should be given great care and attention.

6.2 Runoff issues

The topic of runoff wastewater is a major concern when water blasting is used for the removal of exterior lead based paint. Much of the industry is presently allowing the contaminated wastewater to run down into the city sewerage system. This level of lead pollution is very high and the result is the contamination of the Pacific Ocean and the San Francisco Bay. The end result is a major environmental hazard due to the fact that the municipal treatment facility is not designed to treat this type of waste (Rourke, Danial). The Department of Public Works for the City and County of San Francisco has created an ordinance which limits the levels of lead that can be released into the wastewater system but it is not strictly enforced due to the lack of public interest and money (Rourke, Danial).

6.2.1 Allowable and safe lead runoff concentrations

In compliance with the Federal Clean Water Act, as amended, and attendant Environmental Protection Agency regulations, the San Francisco Department of Public Works has adopted Industrial waste discharge limits on wastewater discharges into the City's sewerage system (DPW, Order No. 158170). Lead is included in this order and is characterized as a pollutant. The order states that the characteristics of any 24 hour composite sample representative of a wastewater discharge generated over that period of time shall not exceed the set concentration-based numerical limits. In this order the numerical limit for total lead concentration is set at 1.5 (mg/L). The wastewater resulting from water blasting can greatly exceed this set concentration limit and therefore creates an environmental threat which must be controlled.

6.3 Containment

Wastewater containment is often a method used to alleviate the sewerage contamination problem. The runoff water is channeled and corralled by the incorporation of sandbags and impenetrable plastic sheeting. Then the paint chips can be recovered and disposed of properly.

6.3.1 Proposed containment techniques

Proper containment techniques include the sealing off of all nearby sewerage drains and ground coverage of all effected areas. Impenetrable plastic sheeting should be used as the ground cover material. The sheeting should be laid down in a

way that eliminates surrounding soil and sewerage contamination. Methods of wastewater settlement and filtration should be investigated as possible solutions. However, they are currently considered to be hazardous waste treatment and must be accompanied by a permit. These treatment activities are presently regulated by the San Francisco Department of Public Health, Hazardous Waste Bureau.

7.0 Alternative Methods

7.1 Issues surrounding surface preparation and encapsulation

The main focus in the painting industry in recent years has been blast containment. Painters not only have to paint the surface but they have to prepare it first. Therefore, containing the debris while preparing the surface is a major concern. However, a few years ago containment of the debris was not an issue. The contractors were primarily using hand scraping tools and dry abrasive blasting machines. Since then contractors have become more aware of the health hazards of the blasting debris, which contains lead-based paint most of the time. This has pushed the painting industry to develop alternative methods that do not harm the environment, the worker, or the residents near the surface preparation site.

Two basic approaches to abating lead-based paint hazards are available at the housing unit level: removal of lead-based paint from the dwelling unit, and making lead-based paint inaccessible (enclosure and encapsulation) (Comprehensive and Workable Plan for the Abatement of Lead-Based Paint in Privately Owned Housing, 4-5).

The removal of lead-based paint from a dwelling can be accomplished in three different ways: strip on-site, remove contaminated materials from the building and strip off-site, or complete replacement. There are several methods of stripping on-site. These methods are removal by hand scraping using a heat gun, abrasive removal, and chemical removal. High-Efficiency Particle Air (HEPA) filtered vacuums should be used to capture the dust generated by abrasive removal methods. On-site removal of lead-based paint requires worker safeguards, including protective clothing, respirators, personal hygiene protocols, and periodic blood lead testing (ibid, 4-5).

Encapsulation or enclosure of a dwelling makes the lead-based paint inaccessible. These methods generate less lead dust and reduce any hazards because they generally do not break the surface of the paint.

7.1.1 Surface preparation using heat guns

The latest version of the HUD Lead Hazard Reduction Guidelines prohibit open flame burning and requires that heat guns be operated below 1100 degrees Fahrenheit. There is no such requirement in California except in HUD managed properties. High levels of airborne lead can be produced and dispersed by operating

heat guns above this temperature. While dangerous lead fumes are presumably not emitted below 1100 degrees Fahrenheit, significant amounts of potentially harmful organic vapors can be released.

Depending on the size of the area being prepared, paint removal using a heat gun can be slow and labor intensive. Complete removal of the paint, particularly in corners, requires an attention to detail. A thorough clean-up is also necessary to ensure that a lead residue does not remain. Consequently, the heat gun is recommended only on wood surfaces with limited surface areas in well ventilated spaces(HUD Guidelines, 11-20).

7.1.2 Surface preparation using dry abrasive blasting

Dry abrasive blasting has been proven to be the least effective in keeping dust and debris levels down. Even with extensive vertical and ground shielding around the worksite, total containment remains low(HUD Guidelines 11-19). The addition of Blastox, a waste minimization process, to the abrasive will reduce most of the waste from hazardous to non-hazardous. The special chemistry in Blastox acts to limit the solubility of a wide range of toxic metals by both chemical and physical means. Although a 15% ratio of Blastox by weight will adequately reduce lead levels to below the EPA limit, it will not reduce the debris volume. The use of Blastox is accepted in 45 states in the United States without attaining a hazardous waste treatment permit. However, Blastox is mainly used on steel structures and has not been fully adopted by residential contractors(Polega, Letter to Vicini, 2-3).

To help keep the dust levels down, contractors have switched from dry blasting to modified techniques using water. In wet blasting dust levels can be significantly reduced. The problem now is how to clean up the potentially lead-contaminated water. Since only 1.5 parts per million lead are allowed in runoff water, cleanup of the debris is labor intensive and complex.

7.1.3 Surface preparation using chemical strippers

The only positive aspect of chemical stripping is that less lead dust is generated compared to other removal methods. Chemical stripping must be allowed to dry after it is applied, therefore removal is a slow process. It is also very expensive depending on the product that you are using and it is always labor intensive(HUD Guidelines, 11-23).

Paint removers come in two forms, caustic and non-caustic. The caustic chemical removers are very toxic and require the worker to wear protective clothing at all times. The non-caustic removers are non-hazardous but are not as thorough as the

caustic removers. Non-caustics should not be used when abating a surface that has many layers of existing paint(HUD Guidelines, 11-24).

Most chemical removers are efficient over a limited temperature range. They are completely ineffective in cold weather and should not be used if the humidity is high. The contractor must also check the weather reports before abating. Rain can ruin a surface preparation job and can also cause environmental contamination by the lead paint and the chemical remover.

Using chemical removers on wood surfaces requires much attention. It is important to accomplish the entire neutralization and cleaning process without letting the surface dry. If the wood dries before the clean-up is complete, the pores in the wood may close and lock lead residues inside. These residues can then leach out and contaminate the new paint. Chemical strippers are mainly used on historical houses where preservation requirements apply(HUD Guidelines, 11-24).

7.1.4 Encapsulants

Encapsulation is the least labor intensive of all of the methods named above. It also requires little skilled labor and seems to be the most cost efficient method(HUD Comprehensive and Workable Plan, 4-6). However, no tests are available on the durability of the encapsulants. The necessity of future need for re-encapsulation is not considered in cost-effectiveness calculations.

Encapsulants are intended to prevent chaulking and flaking of lead covered surfaces from becoming part of household dust or accessible to children. Because of this, worker protection requirements were reduced at the suggestion of the National Institute for Occupational Safety and Health (NIOSH). When encapsulation methods are in use, respirators are only needed during surface preparation activities. Encapsulation does not rid the dwelling of the lead-based paint though. The problem is only postponed for the future. Consequently, the decision of choosing encapsulation over removal methods is a major question for homeowners. Encapsulants have also been primarily used indoors.

7.2 New methods of surface preparation

The latest concerns about lead poisoning and the environment have pushed industries to develop new methods of removal. These methods are more expensive, but have proven to significantly reduce the volume of hazardous waste produced. These methods are vacuum blasting and recyclable blasting.

Vacuum blasting is simply abrasive blasting with a vacuum component attached

to the blast head. Little, if any shrouding is needed when using this method. The blast head must remain in continuous contact with the surface to avoid dispersal of the blast media and potentially hazardous particulate (HUD Guidelines, 11-22).

The equipment can be outfitted with a device that can separate the blast media from the paint. This effectively recycles the blast material and dramatically reduces the volume of waste. This is important to the contractor because it saves him or her money for hazardous waste disposal. Some areas, however, have limited the types of abrasives which may be recycled.

One drawback to vacuum blasting is that the equipment is very heavy and labor intensive. Also, attempts to use this process on wood, plaster and other soft materials have been unsuccessful. Vacuum blasting is recommended for masonry surfaces such as stucco, brick, and concrete (HUD Guidelines, 11-22).

The equipment and technology for field applications of recyclable abrasives are relatively new. New generations of recycling machines clean the recycled grit thoroughly, minimizing the cost of disposal. Media-recycling has not been fully adapted for residential projects.

7.3 Cost of alternative methods

On-site removal of lead-based paint generally requires worker safeguards enforced by Cal / OSHA, including protective clothing, respirators, personal hygiene protocols, and periodic blood lead testing. When estimating, the costs of these precautions should be taken into account. If these regulations are not followed by all the contractors in the industry it will lead to an unbalanced bidding system.

Chemical stripping is the least expensive removal method for exterior walls which have the largest surface areas. Open abrasive methods of paint removal are generally not very successful. Encapsulation is generally less expensive than paint removal (HUD Comprehensive and Workable Plan, 4-10).

7.3.1 Issues surrounding costs

The costs of the different methods of surface preparation will differ. It is up to the individual contractor to decide which method is the most cost effective. Some contractors try to cut corners and presume that the paint on the dwelling contains no lead. This way they will not have to deal with expensive containment and handling techniques and hazardous waste disposal. If leaded paint is a consideration, the contractor has to decide whether he or she will save money by reducing the amount of

hazardous waste or not. Utilizing recyclable abrasives, such as steel grit and plastic media, will reduce hazardous waste volume and save money in disposal costs. However, with this new technology comes a high price. Waste disposal money is saved, but a sizable investment in equipment is necessary(JPCL, TIPS-5B, 43).

The end result of proper compliance with regulatory requirements is a higher cost to perform work. The cost can run up to 300 percent more per square foot, independent of the cost of the hazardous waste disposal. It is not uncommon to see larger blasting projects with well over \$500,000 worth of equipment on one site(JPCL, TIPS-5B, 38).

Once the method is finalized, the contractor has to decide whether it will be more efficient to buy the equipment or to lease it. New technologies, which are very costly, are usually leased because it is too great of an investment for an untried system. Therefore, the option to purchase is still left open if the system works well.

Some contractors are submitting low and irresponsible bids assuming that the surface is lead free. These bids threaten the industry and the environment and impede progress due to a lack of knowledge and carelessness(Tom Lewis, interview). The consequences for this type of work ethic include serious environmental liabilities.

Opponents to the new methods of technology argue that the costs are too high. But what are the alternatives? Dry abrasive blasting is falling out of favor. Water blasting and high pressure power washing do not comply with leachable levels of lead allowed into the sewer stream. These techniques are coming under greater scrutiny because of this. Collection, treatment, and disposal of the used water can be more costly than the use of new technologies such as recyclable abrasive blasting and vacuum blasting(JPCL, TIPS-5B, 43).

In this day and age we cannot afford to be environmentally irresponsible when new alternative methods exist that are cost-effective and safe. As more contractors work with these technologies productivity will increase. But for now, contractors and owners all have to understand the costs of the new technology and act responsible in order to keep the environment, the workers, and the surrounding residents safe.

8.0 Recommendations

Without protective measures, the use of abrasive blasting and high pressure washing as a means of paint removal and/or surface preparation on the exterior of residential housing poses a very significant health hazard if lead based paint is present. Activities which disturb surface coatings such as scraping, blasting or sanding can turn a localized hazard (such as deteriorating paint on a section of a wall) into a widespread hazard by spreading toxic levels of lead dust, chips and debris into the air and onto nearby structures and soil. Remediation of this type of contamination is complex and expensive.

Abrasive blasting in San Francisco is essentially unregulated. Contractors must of course adhere to the occupational safety standards promulgated by CAL/OSHA, disposal requirements mandated by CAL/EPA and the appropriate air quality regulations. The Bay Area Air Quality Management District has a specific regulation for abrasive blasting (Regulation 12, Standards of Performance - Rule 4) but it was written with industrial generators in mind and looks mainly at the use of approved abrasives and the production of gross amounts of visible emissions. As of this time, San Francisco has no regulations dealing with the safe removal, containment and disposal of lead-based paint. The city and county of San Francisco needs some type of abrasive blasting and high pressure washing regulations to address clean worksite practices and adequate handling and containment of blasting products and lead-based paint debris.

When a complaint about abrasive blasting operations is received at the Air Quality District, an inspector is immediately sent out if there is a good possibility that the inspector can witness ongoing operations and possible violations. The inspectors are limited by staff size and by what they can cite. With existing regulations, all that an Air Quality inspector can really do is make sure that approved abrasives are being used, and if possible, measure dust emission and compare it to the Ringlemann Standard. The Inspector must visually witness all violations, including those involving particulate traveling across property lines. Realistically, this is difficult to accomplish. The Air Quality Nuisance regulations have little effect in these situations because they concentrate on nuisances of odor.

Water blasting and its related wastewater contamination issues also pose an environmental threat to the City of San Francisco. Lead concentrations in the resulting wastewater of water blasting often are too high to safely pass through the municipal

wastewater sewerage treatment facilities. These high concentrations of lead create a burden on the system which in turn calls for expensive treatment. The Department of Public Works has set limitations on total lead discharges but the ordinance is directed toward large quantity generators and industrial plants, not the painting and surface preparation industry. For the reason stated above, the issues surrounding these paint removal techniques must be treated with more scrutiny.

Inspectors from the San Francisco Department of Public Health have few powers when dealing with abrasive blasting situations because there is nothing in the codes which they can reference in regards to issuing a citation. Inspectors from the Health Department must by necessity rely on Hazardous Waste and Hazardous Material regulations contained in the Health and Safety Code. Inspectors can prevent activities dangerous to the public health but there are no clear guidelines for abrasive blasting. Proving that an operation is dangerous to the public health and documenting violations is difficult because the necessary lab tests take several days or even a few weeks to process, by which time the operations have usually been completed.

We have placed our recommendations in the form of a draft San Francisco ordinance so as to better illustrate both our suggestions and choice of language. We feel that some type of approval or permitting process for abrasive blasting or high pressure washing would be ideal, however our first thought in compiling our recommendations was avoiding the creation any new layers of bureaucracy. **The main goal of any ordinance regulating surface preparation of residential exteriors should be to ensure the proper containment of any and all generated debris so as to protect the environment and adjacent public and private property.** Other issues, such as worker safety and proper handling and disposal of lead-burdened debris have already been mandated by agencies such as Cal/OSHA and Cal/EPA and just need more stringent enforcement.

In the next few years, the measures contained in Title X and TSCA will be enacted and enforced by the U.S. EPA. In the meantime, we feel that the creation and adoption of an ordinance containing language that can be referenced by enforcement authorities when citing violators is necessary to protect the community and environment.

Another approach may warrant additional consideration. In San Francisco, extensive permits and approvals are needed for most types of home remodeling and renovation projects. Permits are needed for jobs as simple as replacing stairways or window units. In addition to the code enforcement provided by inspectors from the

Bureau of Building Inspection, homeowners are under significant peer pressure from their neighbors who can and often do report unauthorized construction. If caught, the owner can be forced to remove the products of unauthorized work and return the dwelling to its original specifications.

If a permitting process for exterior surface preparation work is desired by the city, utilizing the existing remodeling/renovation permitting process, facilities and bureaucracy would be a logical choice so as to minimize costs of implementation. One aspect which would have to be carefully considered would be the jurisdiction, powers and role of the Housing, Health and Air Quality inspectors, all of whom would naturally be interested in assuring compliance with new surface preparation regulations.

1 *(Draft copy for review and comment)*

2
3 Division I - General Provisions

4
5 Title: Abrasive Blasting and High Pressure Washing
6 Regulations
7

8
9 **Findings:**

10 **Abrasive blasting:** Without protective measures, abrasive blasting as a
11 means of paint removal and/or surface preparation on the exterior of residential
12 housing poses a very significant health hazard if lead based paint is present. Activities
13 which disturb surface coatings such as scraping, blasting or sanding can turn a
14 localized hazard (such as deteriorating paint on a section of a wall) into a widespread
15 hazard by spreading toxic levels of lead dust, chips and debris into the air and onto
16 nearby structures and soil. Remediation of this type of contamination is complex and
17 expensive.

18 Alternative methods of surface preparation are being developed and used to
19 alleviate the problems that are associated with abrasive blasting techniques. **Water**
20 **blasting** is one of the alternative methods that is becoming more and more popular
21 for surface preparation because it does not generate large amounts of airborne debris.
22 While water blasting does avoid the air contamination issues, the method does have
23 related problems that are associated with it. The resulting contaminated wastewater
24 that is generated from the method of water blasting is the most significant problem that
25 results from this type of surface preparation because the lead concentrations in the
26 resulting water will exceed the set pollution limits. The method of water blasting and
27 its related wastewater problems must be regulated further to control this environmental
28 threat.

29 Abrasive Blasting in San Francisco is essentially unregulated. Power washing
30 is not regulated at all. Contractors must of course adhere to the occupational safety
31 standards promulgated by CAL/OSHA, disposal requirements mandated by CAL/EPA,
32 and the appropriate air quality regulations. The Bay Area Air Quality Management
33 District has a specific regulation for abrasive blasting (Regulation 12, Standards of
34 Performance - Rule 4) but it was written with industrial generators in mind and looks

mainly at the use of approved abrasives and the production of gross amounts of visible emissions. As of this time, the City and County of San Francisco has no regulations dealing with the safe removal, containment and disposal of lead-based paint. The City and County of San Francisco needs some type of abrasive blasting and power washing regulations which address clean worksite practices and adequate handling and containment of blasting products and lead-based paint debris.

Purpose and Goals

Purpose: These regulations are intended to protect the public health and welfare by addressing the problems inherent in using abrasive blasting and high pressure wash techniques on exterior surfaces containing lead based paint, and to address containment issues in general as they pertain to exterior residential surface preparation.

Goals: Ensuring that residential abrasive blasting and high pressure washing is conducted responsibly, and that measures are taken to ensure that dust, debris and particulate matter do not contaminate or spread about the worksite or adjacent property.

Definitions:

Abrasive Blasting: The operations of cleaning or preparing a surface by forcibly propelling a stream of abrasive materials against the surface.

Accredited Laboratory: Any laboratory which meets the standards and qualifications issued by the EPA as directed under the Federal Lead Hazard Reduction Act (Title X)

HEPA or "High Efficiency Particulate Air" filter: a filter capable of filtering out particles of 0.3 microns or greater from a body of air at 99.97 percent efficiency or greater.

Hydroblasting: Any abrasive blasting using high-pressure liquid as the propelling force.

Impenetrable Material: a non-porous material not easily ripped or torn. An example of an impenetrable material is, but is not limited to, polyethylene plastic sheeting at least six mils in thickness.

Lead-based Paint: Paint containing lead greater than or equal to 0.5 percent by

weight, dry surface, also stated as 5,000 ppm. Measured by atomic absorption spectroscopic analysis or equivalent lab analysis.

Paint: any surface coating material

Representative sample: a sample of any paint, including a sample of each layer of paint which is removed from a structure, that may and/or will be removed from a structure.

Vacuum Blasting: Any abrasive blasting in which the spent abrasive and surface material is immediately collected by a vacuum device.

Water Blasting: The operations of cleaning or preparing a surface by forcibly propelling a stream of water, at a pressure at or above 10,000 psi against the surface.

Wet Abrasive Blasting: Any abrasive blasting using compressed air as the propelling force in combination with water to contain the spent abrasive, paint, particulate, dust and/or other debris generated by the operations.

Power Washing: Or "High Pressure Washing" The operations of cleaning or preparing a surface by forcibly propelling a stream of water, at a pressure below 10,000 psi against the surface.

Division II - Regulations

1. Lead-based paint

It is the duty of the owner and the contractor to be fully aware of the nature of the surface that is to be prepared. Ignorance on either the part of the owner or the contractor does not constitute an excuse or release from liability.

2. Notification

Before commencing abrasive blasting, hydroblasting or power washing, the contractor must notify in writing at least five days before beginning operations the following people:

(a) adults residing in the structure from which paint is being removed and/or residing within 50 feet of the structure from which paint is being removed, and

(b) the owner, agent and/or property manager of the structure from which paint is being removed and/or of any building located within 50 feet of the

structure from which paint is being removed, and

(c) the owner, agent or manager of any business or organization in the structure from which paint is being removed and/or within 50 feet of the structure from which paint is being removed, and

(d) the principal of every school and the chief administrative officer of every school within 50 feet of the structure from which paint is being removed.

The notification shall consist of:

(a) The location of the structure from which paint is being removed

(b) The estimated times of start and completion of the project

(c) A brief description of the removal method

(d) The name, address and phone number of the individual or company responsible for the paint removal.

In addition, if the surface contains lead-based paint, the notification must include a statement as such. **[The specific statement wording should be supplied by the Lead Hazard Reduction Committee]**

3. Dry Blasting

Dry abrasive blasting shall be allowed only if any and all spent abrasives, paint, particulate, dust and/or other debris generated by the blasting is immediately collected by a HEPA vacuum unit. Any person using a vacuum blast system must comply with the manufacturers' guidelines when using the system.

Exemption: Dry-blasting of non lead-based paint, as determined by testing of a representative sample by an accredited laboratory is exempt from HEPA filtering vacuum requirements. Operators must still comply with applicable

abrasive blasting and Air Quality regulations.

4. Hydroblasting / Wet Abrasive Blasting

Hydroblasting or wet abrasive blasting may be used for exterior paint removal provided that a vertical containment system is employed that prevents any and all fallout generated by the operation from traveling beyond the ground containment. Additionally, any and all liquid waste generated by the operation must be adequately contained and handled in accordance with applicable waste disposal regulations.

Exemption: Hydroblasting or wet abrasive blasting of non lead-based paint, as determined by testing of a representative sample by an accredited laboratory may or may not be exempt from vertical and/or ground containment requirements depending on the characteristics of the paint being removed. All waste generated by the operation must be adequately handled and contained (if necessary) in accordance to applicable waste disposal regulations.

5. Power Washing and Water Blasting

Power washing and water blasting may be used for exterior paint removal provided that a vertical containment system is employed that prevents any and all fallout generated by the operation from traveling beyond the ground containment. Additionally, any and all liquid waste generated by the operation must be adequately contained and handled in accordance with applicable waste disposal regulations.

Exemption: Power washing and water blasting of non lead-based paint, as determined by testing of a representative sample by an accredited laboratory may or may not be exempt from vertical and/or ground containment requirements depending on the characteristics of the paint being removed. All waste generated by the operation must be adequately handled and contained (if necessary) in accordance to applicable waste disposal regulations.

6. Requirements for Preparation of Work Area

For any type of abrasive blasting, water blasting or power washing, it is required

that adequate containment measures are taken to ensure that all dust and/or debris generated by such practices be contained on the premises. These measures can include but are not limited to: vertical shrouding and ground coverings, liquid containment and capture systems, and simultaneous vacuuming of abrasives and debris.

The following shall constitute *prima facie* evidence of non-compliance with the containment requirements:

(a) visible buildup of particulate matter, abrasive, liquid waste or paint chips on adjacent public or private property.

(b) visible amounts of mist , dust or particulate crossing over the property line.

In addition, when removing lead-based paint by abrasive blasting, hydroblasting, water blasting or power washing the following worksite preparations must be followed:

(a) Remove or cover with an impenetrable material all toys, play equipment and furnishings within a minimum distance of 50 feet.

(b) Place an impenetrable material on the ground at the paint removal worksite, to keep any and all spent abrasive, paint, particulate, dust and/or other debris generated by the paint removal operation from depositing on the ground. If a wet removal system is to be used, procedures must be employed to contain any and all residues generated by the wet operations.

(c) Close all doors and windows on the side of the structure from which paint is being removed and seal them from the outside. Air conditioning units on these and adjacent walls must be turned off and covered.

(d) Erect vertical containment shrouds if there is a visible movement of abrasive material, paint, dust and/or other debris beyond the ground containment.

(e) If a wet removal procedure is to be used, a system must be in place prior to initiation of removal which allows liquid waste to be collected from the ground

containment and placed into appropriate containers for proper disposal.

(f) Site preparation of structures other than buildings must be adequate to prevent spent abrasive, paint, dust and/or other debris from being deposited on the ground, in water or traveling off-site.

7. Requirements for Site Cleanup

At the end of each workday, the following procedures must be followed:

(a) Within 2 hours of ending operations, all loose debris and material generated by the operation must be collected and placed in appropriate containers. This includes material that has collected on scaffolding, platforms, ground covers and sheeting.

(b) If removing lead-based paint, all debris must be collected, labeled and stored as per all applicable regulations.

Division III - Enforcement

[Penalties and fine levels for non-compliance should be determined by the Citizens Lead Hazard Reduction Committee]

GLOSSARY

Abatement - means any measure designed to permanently eliminate lead-based paint hazards in accordance with standards established by the EPA Administrator pursuant to Title IV of the Toxic Substances Control Act (TSCA).

Abrasives - Any material used in abrasive blasting operations including but not limited to sand, slag, steel shot, garnet or synthetic media.

Abrasive Blasting - The operations of cleaning or preparing a surface by forcibly propelling an abrasive material against the surface.

Accredited Laboratory - a laboratory which meets standards established or recognized by the California EPA.

Complete Abatement - Removal or enclosure of all lead-based paint in a dwelling.

Confined Blasting - Any abrasive blasting conducted in an enclosure which significantly restricts air contaminants from being emitted to the ambient atmosphere, including but not limited to shrouding, tanks, dry-docks, buildings and structures.

Containment - A process for protecting both workers and the environment by controlling exposures to lead dust and debris created during abatement.

Contractor - Any business entity, public unit, or person performing the actual work on a lead hazard control project.

Direct-Reading XRF - is an analyzer which provides the operator with a display of a lead concentration calculated from the lead "K" x-ray intensity without a graphical depiction of the spectrum.

Disposal - The discharge, deposit, injection, dumping, spilling, leaking, or placing of any solid waste or hazardous waste into or on any land or water so that any constituent thereof may enter the environment or be emitted into the air or discharged in any waters, including ground waters.

Encapsulation - Any covering or coating that acts as a barrier between lead-based paint and the environment and that relies on adhesion and the integrity of the existing paint bonds between layers in order to act as a barrier between lead-based paint and the living space.

General Identification Number - The unique number assigned by EPA to each generator or transporter of hazardous waste, and each treatment, storage, or disposal facility.

Generator - Any person, by site, whose act or process produces hazardous waste.

HEPA - High Efficiency Particle Air filter.

Hydroblasting - Any abrasive blasting using high pressure liquid as the propelling force.

RCRA - Resource Conservation and Recovery Act.

Renovation - Work that involves construction tasks such as window replacement, weatherization, remodeling, repainting and other home improvements.

Sandblasting - Abrasive blasting using sand as the abrasive material.

Small Quantity Generator - An owner and/ or contractor (generator) who produces less than 100 kg of hazardous waste per month (or accumulates less than 100 kg at any one time) or one who produces less than 1 kg of acutely hazardous waste per month (or accumulates less than 1 kg of acutely hazardous waste at any one time).

Target Housing - Means any residential housing unit constructed before 1978, except housing developed specifically for the elderly or persons with disabilities (unless any child who is less than 6 years of age resides or is expected to reside in such housing).

Toxicity Characteristic Leachate Procedure - A laboratory test method for determining if excessive levels of lead or other hazardous materials could leach into groundwater, usually used for the purpose of determining if the waste is hazardous by the toxicity characteristics.

XRF Analyzer - An instrument which determines lead concentrations in milligrams per square centimeter (mg/cm^2) using the principal of x-ray fluorescence. Two types of XRF analyzers are used, direct readers and spectrum analyzers.

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